DETAILS OF THE WEATHER OF THE MONTH IN THE UNITED STATES.

GENERAL CONDITIONS.

By A. J. HENRY.

The period of high temperature in the United States and Canada evidently culminated in the current month with positive departures at individual stations of as much as 10° and 12° F.—a remarkably large abnormality for a summer month. (See Chart IV of this REVIEW.) Drought continued in the Lake region, the Mississippi and Ohio Valleys, and locally in the Middle Atlantic and New England States. The rainfall was in excess of the average in the South Atlantic and East Gulf States, particularly along the Atlantic coast from Wilmington, N. C. to Jacksonville, Fla.

Pressure was slightly above normal in practically all parts of the country, especially over the Canadian Maritime Provinces and the States of Washington and Oregon where the ocean HIGHS seemed to extend their influence over the continent.

CYCLONES AND ANTICYCLONES.

By W. P. DAY, Observer.

Low pressure areas were numerous with frequent developments over the western Plateau region; however, few reached storm intensity and several disintegrated after a short existence.

Pressure was high continuously during the month over the Atlantic Ocean in the vicinity of Bermuda and off the Pacific coast. The North Pacific HIGH frequently invaded the extreme Northwestern States and most of the migratory HIGHS originated there and drifted eastward and southward. None of the high pressure areas charted were important.

Tables showing the number of HIGHS and LOWS by types follow:

Lows.

	Alberta.	North Pacific.	South Pacific.	Northern Rocky Mountain.	Colorado.	Texas.	East Gulf.	South Atlantic.	Central.	Total.
July, 1921	5.0	.....	.....	.....	6.0	.....	1.0	2.0	1.0	15.0
Average number, 1892-1912, incl.	4.8	0.7	0.3	0.5	0.9	0.2	0.1	0.1	1.0	8.6

Highs.

	North Pacific.	South Pacific.	Alberta.	Plateau and Rocky Mountain Region.	Hudson Bay.	Total.
July, 1921	4.0	.....	2.0	1.0	2.0	9.0
Average number, 1892-1912, incl.	1.3	0.3	3.0	1.2	0.8	6.6

NOTE 1.—Henceforth in plotting the paths of low pressure areas on Chart III, secondary developments will be given the designation, "A," "B," etc., in their order of appearance or development from the parent LOW. Further developments from secondaries will carry the designation of the secondary and the lower case letters "a," "b," etc. in the order of occurrence.

THE WEATHER ELEMENTS.

By P. C. DAY, Climatologist and Chief of Division.

[Weather Bureau, Washington, D. C., Sept. 1, 1921.]

PRESSURE AND WINDS.

Probably the most significant feature of the atmospheric pressure distribution during the month was the persistent high pressure over the far Northwest. The pressure is normally high during the summer season over the Pacific coast districts from central California northward to Washington, but there are usually periods when it becomes relatively low, due to the passage inland of cyclonic areas from the Pacific. During July, 1921, pressure was constantly above 30 inches along the coast of Oregon and Washington, and even further inland the average for the month was the highest of record. As a result no storms entered the country from that region and local weather changes were unimportant during the entire month. Over the Southeastern States pressure was likewise higher than normal due to the extension of the North Atlantic HIGH further westward than usual into that district. This preponderance of pressure in southern districts, so persistent during the present year, and a tendency exhibited by low areas to pursue their eastward courses near the Canadian border, favored a continuation of southerly winds and warm weather over many of the central and northern districts from the Rocky Mountains eastward.

Areas of low pressure developed rather frequently over the Plateau and Great Plains districts, but they usually weakened in their eastward courses and soon disintegrated. The HIGHS entered the country mostly as weak offshoots from the permanent high area over the Pacific Northwest. As they moved slowly eastward in rather low latitudes they brought only slight daily changes in pressure, and lacked the coolness that usually attends the movement of HIGHS southward from the Canadian Provinces.

For the month as a whole pressure was above normal in all portions of the country, save locally in central California, and along the Canadian border.

As a result of the usual slight variations in pressure the winds were comparatively light, save in connection with the occurrence of thunderstorms or other types of summer storms. From the Plateau and Rocky Mountain districts eastward, the prevailing winds were from southerly points, and these directions were maintained locally over long periods. In the far West, as a result of the continued high pressure over Washington and Oregon they were mainly from northerly points.

TEMPERATURE.

In the absence of marked changes in barometric pressure during the month, temperature showed a corresponding stationary condition and there were few important changes. The persistent warmth that has marked the present year to date over much of the interior and northern parts of the country, and that became so pronounced during the latter half of June, particularly in the great central valleys, continued without a material break

throughout that region till the end of the month. In the vicinity of the Great Lakes the temperature continued above the normal daily from early in June till the 30th of July, a period of time unsurpassed in the history of the Weather Bureau for that or probably any other section of the United States. In other portions of the country, particularly in the far West, the temperatures were less uniform, notably during the first week of the month, when it was moderately cool to westward of the Rocky Mountains, and during the second and third weeks, when cool weather prevailed over the Southwest. The last decade of the month had moderately cool weather in most Southern States, and the last week had weather somewhat cooler than normal over most districts from the Rocky Mountains westward.

Maximum temperatures above 100° were observed at some period during the month in practically all portions of the country, save where influenced by proximity to large bodies of water, or over elevated regions. The maximum for the month, 123°, was observed in southern California, and temperatures as high as 110° were observed at points in the southern Plateau and northern Plains.

In the far western districts the coolest weather was experienced near the beginning of the month, when temperatures below freezing were observed at nearly all high stations. In the districts to the eastward the coolest weather was confined mostly to the last decade, and the last day of the month was the coolest over the upper Mississippi Valley and Lake region.

The average temperature for the month as a whole was above normal in practically all central and northern districts, the area of greatest excesses being located over the upper Mississippi Valley and Lake region, where they ranged from 6° to 12°. In portions of this area the month was the warmest of record during the period of Weather Bureau observations, more than 50 years, and this tendency toward an excess of heat has been maintained for many months, At Chicago, Ill., July was the eleventh consecutive month with average temperature above normal, the excess since the first of the present year amounting to more than 8° per day, a condition which has not previously existed in the history of that station.

Over the Southwest and generally along the Pacific coast, and in the extreme Southeast the month was slightly cooler than normal.

PRECIPITATION.

The precipitation for the month as a whole was fairly generous over most of the country where appreciable amounts usually occur in midsummer, but the distribution was irregular as to both occurrence and amount. Over the Great Plains from Texas, Oklahoma, and Kansas northeastward and eastward to the Great Lakes and Middle Atlantic States, the average precipitation was nearly everywhere decidedly less than the normal July fall, and considerable areas had but little precipitation at any time during the month. Similar conditions prevailed over the region from the northern Rocky Mountains westward to the Pacific, where the fall was likewise much less than normal. Over portions of the east Gulf and South Atlantic States the precipitation was in excess of the average, and at a few points in this region the monthly amounts were the greatest of record for July. In the Dakotas and Nebraska the monthly falls were slightly in excess, and they were above normal in portions of Arizona, New Mexico, and adjacent States.

The precipitation was mainly from thunderstorms, as is usual for midsummer, but there was a marked absence of conditions favoring the occurrence of such storms over extensive areas at the same time.

SNOWFALL.

Early in the month local snows were reported from points in the Plateau and Rocky Mountain regions. At Yellowstone Park a total depth of nearly 4 inches was reported on the 3d and 4th, the greatest of record for July. On the 9th a summer snowstorm of unusual severity was reported from points in the mountains of southwest Colorado.

RELATIVE HUMIDITY.

Over the central valleys and Great Lakes where unusual heat and partial drought conditions prevailed during the month, the relative humidity, as might be expected, was decidedly less than normal, and similar conditions prevailed in the far Northwest, where there was likewise a well marked deficiency in precipitation. Along the Atlantic coast relative humidity was generally above normal, particularly over portions of New England, where at points it averaged the highest of record for July. It was likewise high over much of the Great Plains and southern Mountain and Plateau regions.

NOTE.—Details regarding severe wind, rain, and hail storms will be found in the table following.